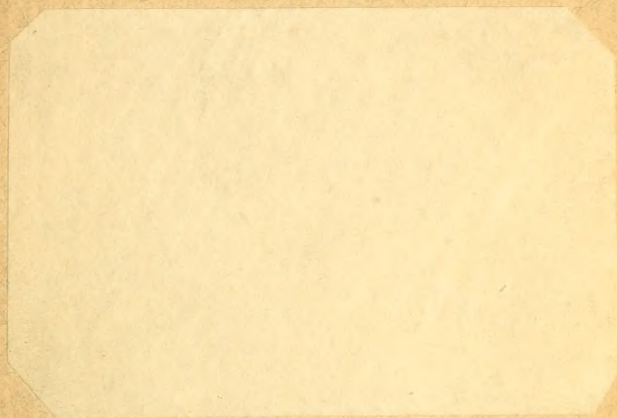


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DEPARTMENT OF COMMERCE  
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CLAM RESOURCES OF THE TEN THOUSAND  
ISLANDS, FLA.<sup>a</sup>

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The large hard clam, *Venus mercenaria mortoni*, found on the west coast of Florida is quite similar, except in size, to the familiar hard clam or quahaug of the Atlantic coast.<sup>b</sup> Since the hard clam is one of our most valuable food mollusks, information relative to the resources of the extensive clam beds found in the region of the Ten Thousand Islands, Fla., is worthy of dissemination.

EXTENT OF CLAM BEDS.

These beds are situated off the shore of the Ten Thousand Islands, extending, generally speaking, northward from Cape Sable, near the southern end of the west coast of Florida, to Gullivans Bay, which is a little south of the city of Caxambas. A natural clam bed extends from Shark Point to Gullivans Bay, a distance of 35 miles. The inner edge of this bed is about one-eighth mile from shore; and the outer, at least 5 miles offshore. It is safe to say that the natural bed of clams situated off the Ten Thousand Islands comprises at least 150 square miles of bottom.

The shores of the Ten Thousand Islands slope very gradually into the Gulf. At a distance of 1 mile offshore the water is about 4 feet deep, and for the next 8 or 10 miles the slope is about 2 feet to the mile. There are places situated within a mile of the shore where bars are exposed at low tide, and it is about these bars that the hand fisherman secures his catch by means of "treading"; that is, stepping on clams with the bare feet and then drawing them from the bottom by means of a two-tined fork with a handle 6 inches in length.

The entire 150 square miles of clam bottom is practically one large bar, the clams being equally as plentiful in water 12 feet deep as on the shallow bars in water 2 feet or less in depth. Clams in these deeper places are inaccessible to the hand fisherman, since tongs are not used in this locality. The clams are so abundant, however, that an average fisherman can dig 250 per hour in the three or four hours during which the tide usually permits him to work.

<sup>a</sup> Based on reports by William C. Schroeder, fish culturist, U. S. Bureau of Fisheries.

<sup>b</sup> The life history of the hard clam or quahaug, *Venus mercenaria*, of the Atlantic coast is described by Dr. D. L. Belding in the Quahaug and Oyster Fisheries of Massachusetts, published by The Commonwealth of Massachusetts (Wright & Potter, State printers, Boston).

The only places where clams were not found in large quantities were at the mouths of the various rivers and "runs" and in the area within about one-eighth mile offshore. There were certain places, however, where clams were abundant within a few hundred feet of the shore. North of Coon Key there are practically no clams near shore, while from south of Lossman's Run almost to North West Cape they may be found in scattered areas.

#### ABUNDANCE OF CLAMS.

The most important shallow bars are located off the following places: Coon Key, Rabbit to Pavilion Key, Clam Point, Alligator Point, and Lossman's Run. These bars also comprise the northern and southern limits of the major clam bar.

Over most of the bed clams are found in numbers varying from 5 to 20 per square yard. In some places they are evenly scattered about, while in others they are grouped together closely with intervening barren patches. When they are found in this latter condition the barren patches are never large, usually a few square yards in extent.

The results of detailed examinations of various representative portions of the bed follow:

*One and one-half miles northeast of Cape Romano (near Coon Key); depth of water 7 feet.*—In a few moments four clams were brought aboard. Clams could be felt with the sponge hook in all places which could be touched from the boat.

*One mile south of Coon Key, within a few hundred feet of the Pyramid Light; depth of water 6 feet.*—In about 10 minutes eight clams were brought aboard. Clams were plentiful.

*Two and one-fourth miles southeast of Coon Key; depth of water 8 feet.*—Plenty of clams were felt with the hook.

*Off Horse Key, close to shore.*—No clams were felt. (In most cases clams were not found within one-eighth mile offshore, but invariably they were found beyond that distance.)

*Round Key.*—Close to shore very few clams were found. Offshore one-half mile they were plentiful.

*Tiger Key and Panther Key, offshore one-half mile.*—Clams were plentiful.

*Rabbit Key to Pavilion Key.*—Between these two keys clams were found to be very plentiful. A bar lies midway between, being fully 1 square mile in area. The pilot, by treading, dug 84 clams in 20 minutes. They were more plentiful, however, than this observation would seem to show, since the water, being about  $2\frac{1}{2}$  feet deep, impeded operations somewhat. In a short time 35 clams were taken by fishing from the boat with a sponge hook. They averaged fully 5 to 10 per square yard at this place.

*Pavilion Key, offshore one-quarter mile.*—Clams were fairly plentiful. Offshore 1 mile clams were very plentiful.

*Bird Rock, about 3 miles southeast of Pavilion Key.*—One-tenth mile offshore clams were fairly plentiful. Three-fourths mile off Bird Rock clams were very plentiful. Twelve were dug with a sponge hook within a space of 1 square yard.

*Clam Point, one-quarter mile south of Bird Rock.*—Clams were exceedingly plentiful. Three men dug 300 in 30 minutes by treading. At this point the bottom is exposed in part during very low tides. The bottom is covered with a thick growth of eel grass in which the clams were very numerous. The clams here averaged from 6 to 15 per square yard, ranging in size from those known to the trade as "little necks" to large ones weighing 4 pounds or more. This bar is about one-half square mile in area.

*Seminole Point.*—Clams were plentiful.

*Alligator Point, three-fourths mile offshore.*—Here lies a large bar, about 1 square mile in area, whereon, of all places, clams were the most plentiful and accessible. It is here that the few clam fishermen usually operate. Off this



bar two men secured a cargo of 3,500 large clams in two to three tides (8 to 12 hours). It is claimed that from an area of about 10,000 square yards 37,000 clams were dug between May and November, 1918.

*Slightly offshore from Alligator Point.*—One of the cannery's dredges is claimed to have dug, within an area of about 1 square mile, 250 bushels of clams almost daily for four years. Over this place where the dredge was supposed to have operated, clams were found in quantities sufficient to warrant digging. In fact, it could scarcely be noticed that any clams had been removed, excepting that those found were somewhat smaller on an average than those found in other places. Thus it can readily be seen what enormous quantities of clams may be found off the Ten Thousand Islands.

*From Alligator Point to Lossman's Run.*—Clams were plentiful. The Ten Thousand Islands and the major portion of the clam bar terminate at Lossman's Run. A few clams were found in scattered areas almost to Northwest Cape.

### SOIL.

The soil has a decided influence on the presence and abundance of the clams. Through many tests it has been found that the soil best fitted for these clams is composed of sticky mud in which eel grass thrives. Forty separate tests were made over a distance of 50 miles in order to discover the abundance of the clams and the character of the soil. It was found that of the 10 places where clams were most abundant 8 contained eel grass, while of the 30 places containing few or no clams only 1 contained this grass, and this was very close to shore. As a rule the harder the bottom the fewer are the clams. On an entirely sandy bottom they do not thrive; but they are rather abundant in places containing a mixture of sand and mud. This sticky mud soil usually contains more or less broken shell and is firm enough to keep a person walking upon it from sinking more than a few inches.

### WATER.

The water about the islands is muddy, due probably to the currents moving over the muddy bottom. The salinity, at the time of investigation, May, 1919, was very high—the density readings ranging from 1.026 to 1.0292—probably at the highest point of the year, since it was at about the close of the dry season, the rainy season beginning in June or July.

### SIZE.

The general size of the clams caught for the canneries is  $2\frac{1}{2}$  to 5 inches, measured from the hinge ligament to the point opposite. Judging by the lines of growth upon the shells these clams vary in age from 3 to 7 years. The character of the dredge used in taking the clams is such that very few clams less than  $2\frac{1}{2}$  inches in size are brought up. The canneries obtain their stock from the operators of the dredge, none being bought of hand operators.

The clams exhibit two marked types of shell character. About 50 per cent are thick shelled, the valves having thick lips, while about 30 per cent are thin shelled with thin lips. The remaining 20 per cent are rather intermediate between these two types. These distinctions may arise from the presence of two varieties of the species but most probably are due merely to individual variation in the growth of the shell.

## DEAD SHELLS.

Dead shells are found almost everywhere on the clam bed. In some places they are very abundant while in others they are occasional. The action of the dredge<sup>a</sup> has probably little or nothing to do with this condition for the following reasons:

1. The dead shells are found, in varying quantities, over almost the entire bar.

2. The clam dredge has worked over but a small portion of the bar and in but two localities.

3. Practically all of the shells are unbroken, while many of them would most likely be otherwise had the dredge been responsible.

4. By treading, several hundred clams were dug in a locality where the dredge certainly had never operated. In this locality many dead shells were found. In some cases a single valve was found lying flat on the bottom, while in many cases both valves were found intact, buried in the mud as in life, but dead and filled with mud.

From these facts it appears that the death of the clams is not due to the action of the dredge. The death rate is probably no greater than might be expected on a clam bed where the temperature was such as to permit abundant development of the young and where the tendency would thus be for the population constantly to approach the maximum which could be supported by the available food supply. In such case any sudden lessening of the abundance of food, even though comparatively slight and of temporary duration, would cause the death of a considerable number of clams. Furthermore, the percentage of individuals dying from old age would not be inconsiderable in a population as dense as that described.

## SPAWNING.

From a rather limited number of observations it would appear that the clams become sexually mature when about 3 inches in size, probably 2 years of age. According to information received locally the spawning season extends from about May 1 to August 1.

## THE FUTURE OF THE CLAM INDUSTRY.

The outlook for the clam industry in this region is very promising. The raw material—that is, the clams—being very abundant and near at hand, and methods having been devised to prepare them into tasty products, the output is only limited by the capacity of the factories<sup>b</sup> and the efforts of their sales departments. The clam has never been exploited as has the oyster. There are people living in the interior who have never seen a live clam and know little of its merits. Those people who live on the coasts and anywhere near a section which yields clams invariably prefer them in the shell rather than canned. Canned clam products, therefore, need considerable advertising before they become universally known and ac-

<sup>a</sup> The dredge used on this clam bed is quite unlike the usual oyster dredge. It is carried on a large scow or boat resembling a house boat and consists of an elaborate piece of mechanism in the nature of an escalator which projects from beneath the boat with the lower end dragging over the bottom. The clams are dug from the bottom by spikes in an endless chain belt and drawn up a wooden trough or incline into the boat.

<sup>b</sup> There are two canneries at present, one being located at Marco and one at Caxambas, both at the northern end of the clam beds.



cepted. But in spite of these facts the factories have been producing thousands of cases annually. A large part of this output is clam chowder and clam juice rather than canned whole clams.

It is quite certain that as long as the dredge works efficiently hand digging for the canneries will not be resorted to again. In order to maintain daily operations the factories must use a dependable and cheap method to obtain clams, for, because of the warm climate, no surplus stock of live clams is allowed to accumulate. It, therefore, can readily be seen that a dependable means of obtaining the clams is of the utmost importance to the efficient and profitable management of the factories.

#### RECOMMENDATIONS.

At the present time there is no immediate danger of the beds becoming depleted, partly because of the great abundance of the clams and partly because there is but one dredge operating.

There will probably be more dredges in operation in the future and should these be of great effectiveness in digging the clams, it is very probable that sharp inroads would be made upon the most accessible bars. If this condition arises, measures of protection should be enforced, among which the following may be suggested:

1. The dredges should not be permitted to operate in water less than 8 feet deep, mean tide. The present law of Florida requires that dredges may not operate in water less than 12 feet deep unless in an open sea where hand operators could not work because of weather conditions. In the locality in question practically all of the shallow bars are situated in the lee of the land. The 12-foot law would seem to work too much of a hardship on the dredgers in this vicinity. The bottom slopes very gradually along this part of the coast so that the 12-foot line would be about 5 miles offshore while the 8-foot line would be from 1 to 3 miles from shore. Prohibition of the dredges from digging on the most shallow bars would not benefit the few local settlers to any extent, but it would enable fishermen from near-by towns to "tread" their clams and carry on their own independent businesses as is done by the few Key West diggers. At the present time there are very few clams taken in this manner and for this purpose, but the future may hold some possibilities along this line.

2. The minimum size of the clams which might legally be taken could be increased from 2 to 3 inches, measured from the hinge ligament to furthest opposite point.

3. A closed season might be established throughout May and June, during which time the major portion of the clams are spawning or have spawned and are in poor condition.

4. The catch of each dredge could be limited to a certain number of bushels per day or the operation of the dredge restricted to certain periods of time.

It would not be necessary to enforce all of these restrictions at the same time for should either Nos. 1, 3, or 4 be put into effect beneficial results would accrue. While No. 2 would be of value, the fact remains that at the present time by far the greatest percentage of clams caught are 3 inches or more in size.

















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